

**BY ORDER OF THE
60TH AIR MOBILITY WING
COMMANDER (AMC)**

**TRAVIS AIR FORCE BASE
INSTRUCTION 48-102**

2 MARCH 2016

Aerospace Medicine

***PREVENTION OF HEAT STRESS
DISORDERS***



COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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RELEASABILITY: There are no releasability restrictions on this publication.

OPR: 60 AMDS/SGPB

Certified by: 60 AMDS/CC
(Col Mark Coakwell)

Supersedes: TRAVISAFBI48-102,
19 December 2006

Pages: 13

This instruction implements Air Force Policy Directive 48-1, *Aerospace Medicine Enterprise*, Air Force Pamphlet 48-151, *Thermal Injury*, and Air Force Pamphlet 10-100, *Airman's Manual*. It establishes responsibilities and procedures to prevent adverse effects of heat stress. This instruction establishes policies and rules for all personnel who are assigned to Travis Air Force Base (AFB) and perform non-flying (ground) duties during periods of hot weather. It does not apply to contractor personnel. It defines the Wet Bulb Globe Temperature (WBGT) Index, WBGT monitoring and reporting procedures, Heat Stress Index, Heat Stress posting, and unusual clothing stipulations. During mission essential, contingency or emergency operations, commanders may waive the provisions of this instruction. However, when commanders waive procedures, they must ensure all supervisors exercise caution, and ensure all subordinate personnel are aware of heat injury symptoms and take actions to protect the health of their personnel. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route Air Force Form 847 from the field through the appropriate functional chain of command. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with (IAW) Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of IAW Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS) located at <https://www.my.af.mil/gcss-af61a/afirms/afirms/>. Additionally, if the publication generates a report(s), alert readers in a statement and cite all applicable Reports Control Numbers in accordance with Air Force Instruction (AFI) 33-324, *The Air Force Information Collections and Reports Management*

Program; Controlling Internal, Public, and Interagency Air Force Information Collections. (NOTE: See Attachment 1, Glossary of References and Supporting Information, associated with this instruction).

SUMMARY OF CHANGES

This publication has been substantially revised and must be completely reviewed. Administrative changes to wording were made throughout the document and grammatical errors were addressed. New procedures for defining the WBGT Index are implemented, updated technical monitoring and reporting procedures for base notification of WBGT conditions are established, and Heat Stress Index/Heat Stress posting notifications are illustrated.

1. OVERVIEW:

- 1.1. This instruction establishes guidance and procedures for performing work and/or physical training activities during severe weather conditions at Travis AFB.
- 1.2. The purpose of this instruction is to provide guidance in the prevention and treatment of weather related injury to Travis AFB personnel.
- 1.3. The focus of this instruction is on thermal injury and severe weather conditions that may cause injury to Travis AFB personnel. Cold injuries are unlikely in the local area as temperatures tend to be moderate in the winter months and rarely drop below freezing.

2. ROLES AND RESPONSIBILITIES:

- 2.1. 60th Air Mobility Wing Commander (60 AMW/CC) will enforce base participation in this program to ensure the health and safety of all personnel on Travis AFB.
- 2.2. 60th Aerospace Medicine Squadron Commander (60 AMDS/CC) will be the final authority for thermal stress conditions for release of Travis AFB Notices to Airmen (NOTAMS).
- 2.3. 60th Aerospace Medicine Squadron Bioenvironmental Engineering (60 AMDS/SGPB) will:
 - 2.3.1. Use the WBGT to measure the hourly heat stress potential from May to October, when weather conditions dictate.
 - 2.3.2. Maintain the right to use discretion in modifying the frequency of monitoring based on local weather conditions (i.e., forecast rain, overcast skies, a drop in temperature), as required by AFPAM 48-151, paragraph 3.1.4.
 - 2.3.3. Ensure thermal stress readings and guidance are available during the duty week when the predicted or forecasted outside temperature reaches 90°F as a daily high, and in support of exercises at the request of commanders.
 - 2.3.4. Forward approved alert message(s), including Flag Conditions according to Attachment 2, to: 60 AMW Command Post (60 AMW/CP), (707) 424-5510 for base wide notification (i.e., AtHoc).
 - 2.3.5. Investigate all thermal stress illnesses documented through the Air Force Safety Automated System (AFSAS).

2.4. 60th Aerospace Medicine Squadron Public Health (60 AMDS/SGPM) will:

2.4.1. When requested, provide thermal stress education and training on preventing and controlling heat induced illness.

2.4.2. Report and track all thermal stress illnesses through AFSAS. **NOTE:** In accordance with (IAW) AFI 33-332, *Privacy Act Program*, records retrieved by name or personal identifier are subject to Privacy Act requirements.

2.5. 60th Force Support Squadron (60 FSS/FSVS) will post Flag Condition(s) at the base Fitness Center when notified by 60 AMDS/SGPB of elevated WBGT temperatures.

2.6. Unit Physical Training Leaders (PTL) will:

2.6.1. Determine whether physical training (PT) can be conducted outside during periods of elevated WBGT temperatures. PTLs should consider conducting PT indoors when severe environmental conditions exist. Refer to AFI 36-2905, *Fitness Program*, for environmental conditions required for fitness assessment testing. P T should not be conducted outside under the following conditions:

2.6.2. Limited visibility due to heavy precipitation/fog.

2.6.3. Temperature reading less than 20°F.

2.6.4. Wind speed greater than 25 mph.

2.6.5. Visibility less than ¾ of a mile if crossing or running beside vehicular traffic.

2.6.6. Lightning when reported within 5 miles, or less than 30 minutes after the last observed lightning strike.

2.6.7. Significant rain (accumulation >0.5 inch/hour).

2.6.8. Hail forecasted or reported within 25 miles.

2.6.9. WBGT greater than 85°F or the heat index greater than 90°F (when a WBGT reading is not available).

2.7. Supervisors will:

2.7.1. Routinely retrieve the thermal stress index from 60 AMW/CP, and implement thermal stress safety procedures accordingly. Work center supervisors may have to adjust work-rest cycles for operations that require workers to wear heavy personal protective equipment (PPE).

2.7.2. Ensure employees working outside in hot environments increase their fluid intake, reference Attachment 3.

2.7.3. Ensure all employees are trained to recognize thermal stress disorders and undertake first aid treatment as appropriate, reference Attachment 4.

2.7.4. Ensure employees are acclimatized IAW paragraph 4.

2.7.5. Ensure all reported thermal stress illnesses are in AFSAS.

2.8. Work center employees will:

2.8.1. Understand the signs and symptoms of thermal stress, and the associated first aid treatments.

2.8.2. Report all thermal stress illnesses to work center supervisors.

3. MONITORING HEAT STRESS:

3.1. 60 AMDS/SGPB will routinely monitor heat stress index during the summer months. The summer monitoring period will typically begin in mid-May and end in early October. The summer monitoring period may be increased or decreased based on seasonal variations.

3.1.1. When the predicted or forecasted outside temperatures reach 90°F as a daily high, 60 AMDS/SGPB will perform heat stress monitoring at least four times during the hottest part of the day, (i.e., 1000, 1200, 1400, & 1600 or 1100, 1300, 1500, & 1700).

3.1.2. When the WBGT heat stress index reaches 85° F, 60 AMDS/SGPB will initiate heat stress monitoring hourly until the WBGT heat stress index is 84.9°F or below.

3.1.3. 60 AMDS/SGPB will monitor heat stress index readings remotely using a dedicated laptop and electronic WBGT monitoring equipment, and notify 60 AMW/CP when conditions reach notifiable levels IAW section 2.3.5. of this instruction. Specific heat stress monitoring notification procedures can be obtained from the 60 AMDS/SGPB office at (707) 423-5490.

3.1.4. The heat stress index is a tool to provide guidance to workplace supervisors in order to reduce heat stress injuries. The heat stress index should not be used directly for operations requiring the use of heavy layered PPE or hot indoor operations.

4. ACCLIMATIZATION:

4.1. Acclimatization is a series of physiological adjustments, which occur when an individual is exposed to a hot or cold climate. A period of acclimatization is required for all personnel regardless of each individual's physical condition. The better the individual's physical condition, the quicker acclimatization is reached. Acclimatization is achieved through progressive degrees of heat exposure and physical exertion. Acclimatization to heat begins with the first exposure and is usually developed to about 50% by the end of the first week. Substantial acclimatization (about 78%) should occur by the end of the second week. Full acclimatization is attained quickest by gradually increasing periods of work in the heat.

4.2. Acclimatization is required for the following:

4.2.1. Individuals who are routinely and occupationally exposed to strenuous duties or heavy work in climatic conditions that significantly vary. This may occur during regular duty or work as outside temperatures increase during the Spring and Summer.

4.2.2. Newly assigned personnel arriving from cooler climates should follow the acclimatization guidelines given above.

4.2.3. Personnel returning to work after illness should undergo re-acclimatization.

4.3. For personnel needing acclimatization, supervisors should adjust work schedules. The most strenuous tasks should be performed early in the morning or late in the evening with lighter duty tasks performed during the remainder of the duty day. As personnel become

acclimatized, work schedules can be shifted to normal routines. When un-acclimatized personnel are exposed to heat, they may experience some discomfort and signs of heat strain, (i.e., high body temperature, increased heart rate and fatigue.) During the two weeks it takes to acclimatize, personnel should be especially aware of the signs and symptoms of heat stress disorders and drink plenty of water. When discomfort and heat stress symptoms occur, personnel should self-pace their activities to perform below maximum physical capacity by interspersing brief, unscheduled and in-place breaks. After a period of one to two weeks, personnel should be able to perform all work related tasks without difficulty.

JOEL D. JACKSON, Colonel, USAF
Commander

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

AFI 33-324, *The Air Force Information Collections and Reports Management Program*, 6 March 2013

AFI 33-332, *Air Force Privacy and Civil Liberties Program*, 12 January 2015

AFMAN 33-363, *Management of Records*, 1 March 2008, (Incorporating Change 1, 28 January 2015)

AFPAM 10-100, *Airman's Manual*, 1 March 2009, (Incorporating Change 1, 24 June 2011)

AFPAM 48-151, *Thermal Injury*, 18 November 2002

AFPD 48-1, *Aerospace Medicine Enterprise*, 23 August 2011

Prescribed Forms

No forms are prescribed in this publication.

Adopted Forms

AF 847, *Recommendation for Change of Publication*, 22 September 2009

Abbreviations and Acronyms

ACGIH—American Conference of Governmental Industrial Hygienists

AFSAS—Air Force Safety Automated System

AMDS—Aerospace Medicine Squadron

AMW—Air Mobility Wing

CC—Commander

CP—Command Post

°F—Degrees Fahrenheit

FSS—Force Support Squadron

MDS—Medical Squadron

NOTAMS—Notices to Airmen

OPR—Office of Primary Responsibility

PPE—Personal Protective Equipment

PT—Physical Training

PTL—Physical Training Leader

Travis AFB—Travis Air Force Base

TLV—Threshold Limit Value

WBGT—Wet Bulb Globe Temperature***Terms***

Acclimatization—A series of physiological adjustments, which occur when an individual is exposed to a hot or cold climate. In simple terms, this is considered a break-in period to help personnel slowly adjust to hot and cold environments.

Heat Stress—The net heat load to which a worker may be exposed from the combined contributions of metabolic cost of work, environmental factors (air temperature, humidity, air movement, etc.) and clothing. In simple terms, heat stress is the body burden from these three categories.

Heat Stress Posting—Visual notification of heat stress flag conditions, work rest cycles and or special personal protective equipment.

May—Indicates an acceptable or satisfactory method of accomplishment.

Should—Indicates a preferred method of accomplishment.

Thermal Stress —The common term used to cover both heat and cold stress.

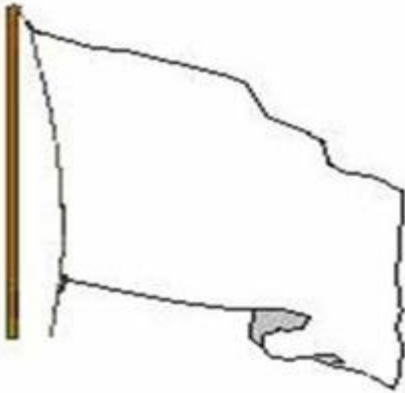
Wet Bulb Globe Temperature—An instrument used to measure the heat stress index.

Will—Indicates a mandatory requirement and is also used to express a declaration of intent, probability, or determination.

Work-Rest Cycle—A guidance schedule for personnel to ensure adequate rest breaks are taken to avoid heat stress disorders.

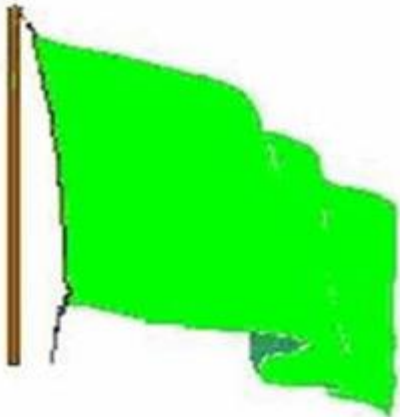
Attachment 2**FLAG CONDITIONS**

Readings given are in degrees Fahrenheit (°F) Wet Bulb Globe Temperature (WBGT) index. Readings are not ambient temperature or heat index temperature.

WHITE FLAG (78 – 81.9°F WBGT)

Non-acclimatized: Extremely intense physical exertion may cause heat exhaustion or heatstroke. Use caution conducting physical activity.

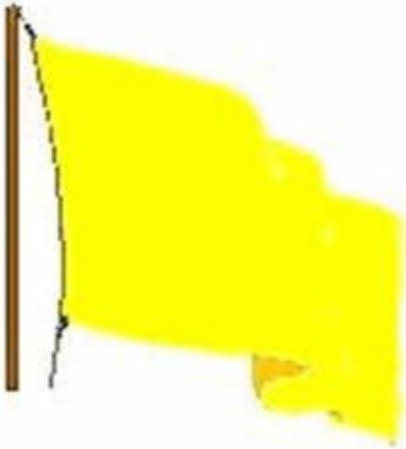
Acclimatized: Normal activity

GREEN FLAG (82-84.9°F WBGT)

Non-acclimatized: Use discretion in planning intense physical activity. Provide constant supervision.

Acclimatized: Normal activity.

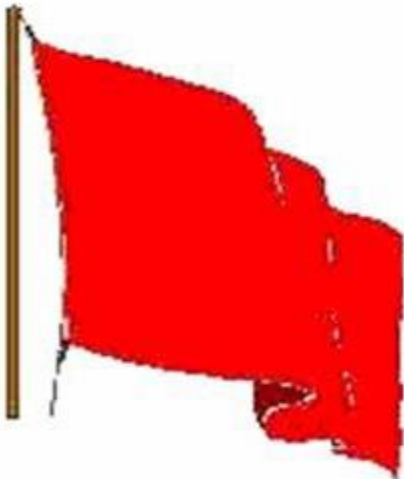
YELLOW FLAG (85-87.9°F WBGT)



Non-acclimatized: Curtail strenuous exercises. Outdoor classes involving physical exertion canceled. Curtail outside work details. Provide constant supervision.

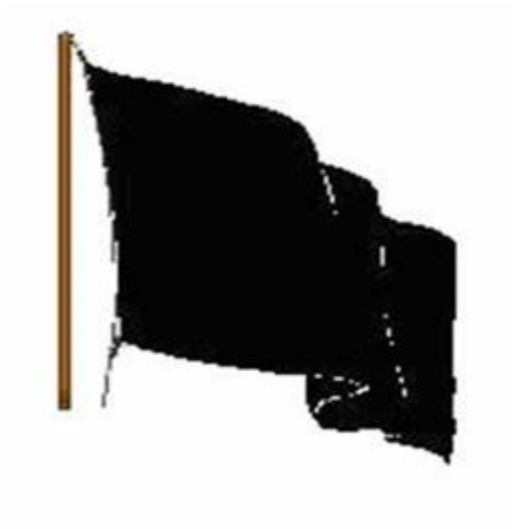
Acclimatized: Use discretion in planning intense physical activity. Provide constant supervision.

RED FLAG (88-89.9°F WBGT)



Non-acclimatized: Terminate all physical conditioning when above 88°F.

Acclimatized: Curtail strenuous exercise. Limited conditioning for periods not exceeding 6 hours. Curtail outdoor training involving physical exertion. Provide constant supervision.

BLACK FLAG (\Rightarrow 90°F WBGT)

Non-acclimatized or acclimatized: No physical conditioning. All outdoor classes involving physical exertion canceled when WBGT \Rightarrow 90°F.

Attachment 3

WORK AND REST CYCLES FOR OCCUPATIONAL HEAT EXPOSURES

A3.1. Permissible Heat Exposure Limits: The permissible heat exposure limits are extracted from the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) booklet. The limits in the table below are based on the following assumptions.

A3.1.1. Personnel are assumed to be acclimatized, fully clothed, with average water and salt intake.

A3.1.2. Personnel can take breaks to prevent becoming overheated.

A3.1.3. Exposure limits are based on personnel working in normal work clothing.

Table A3.1. Work Rest Cycle Table (Values given in °F WBGT).

Work-Rest Regimen (per hour)	WORKLOAD		
	Light	Moderate	Heavy
Continuous Work	86	80	77
75% Work/25% Rest	87	82	78
50% Work/50% Rest	89	85	82
25% Work/75% Rest	90	88	86

A3.1.3.1. Continuous Work = No work restrictions.

A3.1.3.2. 25% rest = 15 minute rest each hour.

A3.1.3.3. 50% rest = 30 minute rest each hour.

A3.1.3.4. 75% rest = 45 minute rest each hour.

Table A3.2. Work Level Examples.

Light	Sitting with moderate arm and leg movement
	Standing with light work at machine or bench while using mostly arms
	Using a table saw
	Standing with light or moderate work at machine or bench and some walking about
Moderate	Walking about with moderate lifting or pushing
	Scrubbing in a standing position
	Walking on level at 6Km/hr. while carrying 3Kg weight load
Heavy	Shoveling dry sand
	Carpenter sawing by hand
	Heavy assembly work on a non-continuous basis
	Intermittent heavy lifting with pushing or pulling (pick and shovel)
Very Heavy	Shoveling wet sand

A3.2. Personal Protective Equipment (PPE) Adjustment: Personnel required to wear heavy PPE (e.g., tyvek suits, respiratory protection, etc.) during normal work center processes have increased potential for heat stress. Supervisors of personnel who require heavy personal protective equipment should contact 60 AMDS/SGPB at (707) 423-5490 to identify the appropriate correction factors to **Table A3.1**.

A3.3. Prevention of Heat Stress Disorders:

A3.3.1. Education: Personnel working and/or training in hot environments must be educated on the causes, symptoms, first-aid treatments and prevention of heat disorders. Personnel must also be educated on the following factors, which may contribute to heat injury.

A3.3.2. Water: Drink large quantities of cool water to make up for water lost through sweating. It is better to drink small amounts of water frequently (a pint every 20 minutes) to replace water than to drink large amounts less frequently. Milk and coffee do not make up for water loss. Carbonated beverages, while containing water, are not as effective as water in keeping the body hydrated because of the tendency to delay gastric emptying.

A3.3.3. Salt: Some salt is lost in the sweat. Because the typical North American diet contains so much salt, an individual should season food to taste, but should not make any additional attempts to add excessive salt to the diet. Salt tablets must not be used except under special operating environments when ordered by competent medical authority.

A3.3.4. Clothing: Wear loose fitting clothing, especially at the neck and wrist, to allow air circulation. Wear appropriate headgear. When exposed to the Sun's rays, cover yourself and apply a sun-blocking lotion to prevent sunburn. When not exposed to the sun, consideration should be given to wearing the least allowable amount of clothing.

A3.3.5. Acclimatization: Personnel must be acclimatized to heat exposures. See paragraph 4.

A3.3.6. Work Schedules: Modify work schedules to perform the heaviest work in the coolest parts of the day. When working in hot environments, establish work and rest cycles as outlined in **Table A3.1**. Take rest breaks in cool, shaded areas.

A3.3.7. Food: Avoid eating greasy, fatty or heavy foods.

Attachment 4

HEAT STRESS DISORDERS

Table A4.1. Heat Stress Disorders:

INJURY	SYMPTOMS	FIRST AID
Heat Syncope	Fainting when standing erect and immobile in the heat.	--Remove to cool area. --Allow to recline and provide cool water. --Recovery will be prompt and complete.
Heat Cramps	--Active sweating, muscle cramps. --Spasms, usually in the muscles of arms.	--Remove to cool area. --Massage extremities. --Contact medical facility.
Heat Exhaustion	--Profuse sweating or moist, cool skin. --Cramps in abdomen or limbs. --Pale face. --Dizziness, faintness, weakness, nausea or vomiting. --Weak pulse. --Normal body temperature.	--Treat for shock. --Lay person down in cool area and elevate feet. --Loosen clothing and cool body by sprinkling with cool water or fanning (not to the point of shivering). --Give cool water to drink if conscious. --Contact medical facility.
Heat Stroke	--Headache, dizziness, red face/skin. --Hot, dry skin (no sweating), and strong, rapid pulse. --High body temperature.	THIS IS A MEDICAL EMERGENCY. CALL 911. --Treat for shock. --Lay person down in cool area and elevate feet. --Loosen clothing and cool body by sprinkling with cool water or fanning (not to the point of shivering). --Give cool water to drink if conscious – add two teaspoons of salt to one canteen if available.